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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Assembler, Electrical Accessories I 7-00.921

B-462 or S-191

U. S. Employment Service in
Cooperation with
North Carolina State Employment Service

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.

September 1962

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STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Assembler, Electrical Accessories I 7-00.921
B-462 or S-191

Summary

The General Aptitude Test Battery, B-1001, was administered to a sample of 57 women employed as Assemblers, Electrical Accessories I 7-00.921 at the General Electric Company's plant at Hendersonville, N. C. The criterion consisted of supervisory ratings made on descriptive rating scale. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis, and their combined selective efficiency, the Aptitudes P-Form Perception, F-Finger Dexterity, and M-Manual Dexterity were were selected for inclusion in the test norms.

GATB Norms for Assembler, Electrical Accessories I 7-00.921 - B-462 or S-191

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-462 or S-191

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
P	CB-1-A CB-1-L	80	P	Part 5 Part 7	80
F	CB-1-O CB-1-P	90	F	Part 11 Part 12	85
M	CB-1-M CB-1-N	105	M	Part 9 Part 10	100

Effectiveness of Norms

The data in Table V indicate that 10 of the 17 poor workers, or 59 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 59 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 27 of the 34 workers who made qualifying test scores, or 79 percent, were good workers.

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Assembler, Electrical Accessories I 7-00.921.

II. Sample

The GATB, B-1001, was administered in September 1960 to 57 female workers employed as assemblers at the Hendersonville, North Carolina plant of the General Electric Company. Two of these were excluded from the sample, one who had arthritic fingers which affected her test scores and the other for whom no rating was made due to length of time on the job. The minimum training time for proficiency on the job is approximately two weeks. Trainees were selected for employment by a series of commercial tests and by oral interviews. The following tests were used: the Factored Aptitude Series - Block, Tools, and Parts by Joseph E. King, Ph.D; SRA Non-Verbal, Self Scoring, Form AH, by McMurry and King; and the Flanagan Coordination Test published by Science Research Associates. In addition, a Bolt and Nut Dexterity Test was used for measuring finger and manual dexterity.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education, and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience.

Assembler, Electrical Accessories I 7-00.921

N = 55

	M	σ	Range	r
Age (years)	29.07	7.71	18-43	.252
Education (years)	11.56	1.01	7-12	-.043
Experience (months)	23.98	23.29	2-57	.436*

*Significant at the .05 level

There are no significant correlations between age or education and the criterion. The correlation between experience and the criterion is significant at the .05 level. The correlation may indicate either that the raters had a slight bias in favor of those workers with more experience or that there was a tendency for those workers with more experience to perform better on the job.

III. Job Description

Job Title: Assembler, Electrical Accessories (Elec. equip.) I 7-00.921

Job Summary: Performs a variety of assembling tasks in putting together electrical components for outdoor lighting fixtures. Tapes and solders leads on small transformers. Places insulation in coils. Rivets socket prongs to sockets and attaches lead wires using a power screw driver. Cuts and strips lead wires and solders them to terminals. Attaches small parts to back of photo-electric assembly and cuts off leads and twists leads into place. Assembles luminairs, attaching parts and using power screw driver and power wrench to tighten bolts and nuts.

Work Performed: Assembles electrical components for outdoor lighting fixtures by performing a variety of tasks such as the following: assembles transformers by connecting coil wires, placing insulation on coils, positioning coils and attaching leads, stacking and taping shunts (thin metal pieces about 4 inches long), positioning and attaching capacitors, soldering leads to terminals, and inserting steel strippings in cores; assembles fluorescent luminaires (lighting units consisting of shade, reflector, fixture and other accessories) by positioning and fastening together parts of finding post assembly, riveting post assembly to terminal board, attaching capacitor components to support assembly, securing socket to support assembly, crimping connection on lead wires, placing rubber gasket on reflector and attaching reflector to unit; assembles incandescent luminaires by putting together sub-assembly called a "roller latch", punching holes in reflector and riveting latch base to reflector, attaching light shield to reflector and placing in machine to form flange for removal of glass; assembles mounting sockets for incandescent lighting by placing wire inside porcelain bushing and attaching bushing to holder, pouring epoxy (leak-proof sealing agent) around wire inside bushing, hooking prongs into porcelain part of socket, positioning porcelain socket in shell and riveting assembly firmly together; assembles sockets for fluorescent lighting by positioning components in jig, placing lead wires on connections, securing assembly with screws, and crimping terminals to lead wires; assembles switches by positioning various components in jig, securing them together with screws and placing plastic cover around switch components. Accomplishes assembly operations by using tools and equipment such as pliers, wire strippers and cutters, power shears, soldering equipment, manual and power driven screw drivers, riveting machines, and crimping machines.

IV. Experimental Battery

All tests of the GATB, B-1001, except part E, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings made on Descriptive Rating Scale, Form Sp-21. The rating scale consisted of nine items, each covering

Aptitudes N, P, F and M have the highest mean scores and aptitudes G, V, P, and Q have relatively low standard deviations.

For a sample of 55 cases, correlations of .345 and .266 are significant at the .01 level and the .05 level of confidence, respectively. Aptitude M correlates significantly with the criterion at the .01 level. Aptitude P correlates significantly with the criterion at the .05 level.

B. Qualitative Analysis:

The statistical results were interpreted in the light of the job analysis data. The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Form Perception (P) - required to visualize the shape the assembly is to take when all parts are attached, to readily fit together the separate parts, and to appraise the accuracy and neatness of the assembly when completed.

Motor Coordination (K) and Finger Dexterity (F) - important in picking up and placing smaller parts, in cutting and stripping wires, and in handling tools.

Manual Dexterity (M) - required in handling pliers, screw drivers, sub assemblies and the larger parts, and in producing a compact assembly of the various components.

On the basis of the job analysis data, the following aptitudes are considered obviously unimportant for performing the duties of this job and are considered "irrelevant" aptitudes: V-Verbal Aptitude, N-Numerical Aptitude and Q-Clerical Perception.

C. Selection of Test Norms

TABLE IV

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X	X	X
Irrelevant		X	X			X			
Relatively High Mean			X		X			X	X
Relatively low sigma	X	X			X	X			
Significant Correlation with Criterion					X				X
Aptitudes to be considered for trial norms					P			F	M

Trial norms consisting of various combinations of Aptitudes P, F and M with appropriate cutting scores were evaluated against the criterion by means of the tetrachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of P-80, F-85, M-100 had the best selective efficiency. (These are equivalent B-1002 scores for the B-1001 data for this study.)

VII. Concurrent Validity of Norms

The validity of the norms was determined by computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing as close as possible to one-third of the sample in the low criterion group. A criterion critical score of 30 was used and resulted in 17 of the workers or 31 percent of the sample being placed in the low criterion group.

Table V shows the relationship between test norms consisting of Aptitudes P, F and M with critical scores of 80, 85 and 100 respectively, and the dichotomized criterion for Assembler, Electrical Accessories I 7-00.921 Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Validity of Test Norms for Assembler Electrical Accessories I 7-00.921

(P-80, F-85, M-100)

N = 55

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	27	38
Poor Workers	10	7	17
Total	21	34	55

$r_{tet} = .46$ $\quad X^2 = 3.266$

$\sigma r_{tet} = .22$ $\quad P/2 = < .05$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes P, F and M with minimum scores of 80, 85 and 100 respectively, have been established as B-1002 norms for the occupation of Assembler, Electrical Accessories I 7-00.921. The equivalent B-1001 norms consist of P-80, F-90 and M-105.

IX. Determination of Occupational Aptitude Pattern

The specific norms established for this study did not meet the requirements for allocation to any of the existing 35 occupational aptitude patterns. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.